

ADJUSTABLE BODY SUPPORT SYSTEM**FIELD OF THE INVENTION**

This invention relates to body support systems. More particularly, it relates to systems adapted to adjustably elevate portions of the body to alleviate stress on the 5 body when a person is at rest.

BACKGROUND OF THE INVENTION

People generally sleep in three basic positions: on the back, on the stomach, and on the side. Sleeping on one's side comfortably may be difficult for any of the following reasons: (1) poor neck and head alignment; (2) upper arm tension or 10 pulling on the shoulder; (3) sciatic pressure due to poor lower back alignment; (4) leg tension or pulling on the hip; (5) top leg pressure on the bottom leg. Discomfort from these sources may cause difficulty falling asleep. The root cause of these problems comes from gravity and the interaction between the mattress and the sleeper.

15 Although mattresses that conform to the contour of the body, adjustable beds, and special pillows have been developed to assist in helping people get comfortable when sleeping, none of these solutions provides an optimal arrangement. For example, U.S. Patent No. 5,097,551, incorporated herein by reference, describes a skeletal support pillow for conforming to the bodily skeletal 20 dimensions of a user. Although this reference describes a single pillow having dimensions relative to the user's body that allow the user to rest in a "physiologically neutral position," each pillow is "custom fitted to the skeletal dimensions of the user" and it therefore not readily adapted for mass production or for adapting to the changing dimensions of the user or changing needs of the user, once made.

25 U.S. Patent No. 4,893,367 to Heimreid et al., also incorporated herein by reference, discloses a system of separately adjustable pillows characterized by a plurality of separately inflatable and deflatable pillows which may be emptied or filled with fluid, such as air, from a connected source via a manifold having valves for each pillows. The manifold with valves for each container, while having certain 30 advantages in healthcare applications where a nurse may readily adjust a plurality of pillows from a single bedside location, also has some drawbacks. Specifically, the

single manifold with a plurality of remotely-mounted valves requires connecting tubes to be run to each of the pillows, which may cause the user to become tangled in the tubing, or may limit the user to a particular orientation or distance of the pillows relative to the manifold.

5 While other references discuss single- or multi-part body pillows or inflatable pillows generally, none discuss a sleep system that provides optimal adjustability and functionality. It is therefore desirable to provide a system that is adjustable to each individual's desires to ease pressure points, relieve tension, and achieve proper spinal alignment in the head, neck and lower back areas, and that avoids the
10 disadvantages of previously disclosed support systems.

SUMMARY OF THE INVENTION

One aspect of the invention comprises a system for adjustably positioning at least two body zones of a person relative to a base surface on which the person is resting, the system comprising at least two adjustable sections, each
15 adjustable section having a non-remote, individually adjustable mechanism for adjusting the elevation of the section. Each adjustable section may be adjustable mechanically, pneumatically, or hydraulically.

In one embodiment, each of the at least two adjustable sections comprises an adjustable member, such as an inflatable/deflatable bladder, positioned
20 between an upper non-adjustable cushioned element and a lower non-adjustable cushioned element. In an embodiment with an inflatable/deflatable bladder, the non-remote, individually adjustable mechanism comprises a valve mounted on an outer surface of the bladder.

The system may be adapted to support the at least two body zones of
25 the person while the person is resting on his or her side or while the person is resting on his or her back. In one embodiment, one of the at least two body zones comprises an arm body zone and another of the at least two body zones is selected from the group consisting of: a head/neck body zone and a leg body zone. Each of the at least two sections may comprises an adjustable pillow or a section thereof.
30 Thus, for example, each of the at least two sections may comprise an individual module, such as a system comprising a plurality of pillows having one pillow for each body zone. At least two of the individual modules may be attachable to one another.

In another embodiment, the system may comprise at least one pillow having two or more independently adjustable sections.

The system desirably provides customized spinal alignment for the person and/or is adjustable to provide an elevation relative to the base surface 5 sufficient to position the respective body zone in a physiologically neutral position, such as a position that optimally minimizes pressure points and musculoskeletal stress.

The system may further comprise a hand pump for inflating the inflatable bladder. The system may also further comprise at least one outer casing, 10 such as a pillowcase, for covering the system or a portion thereof and providing a contact surface for contact with the person, the casing comprising a fabric that provides heat reduction, such as via moisture-wicking, heat-normalizing, or a combination thereof.

Another aspect of the invention comprises a system for adjustably 15 positioning, particularly raising or lowering, a head/neck body zone, an upper arm/shoulder body zone, and a thigh/upper leg/hip/lower back body zone of a person relative to a base surface in respective positions chosen to minimize pressure points and musculoskeletal stress during rest on the person's side. The system comprises a first inflatable/deflatable pillow for supporting the head/neck body zone, 20 a second inflatable/deflatable pillow for supporting a top arm in an upper arm body zone, and a third inflatable/deflatable pillow for insertion between a bottom leg and an top leg for supporting the top leg. Each pillow comprising an inflatable/deflatable bladder positioned between an upper non-adjustable cushioned element and a lower non-adjustable cushioned element.

25 Still another aspect of the invention comprises a method of promoting sound rest in a person resting on a base surface. The method comprises the steps of providing a first support for adjustably positioning a head/neck body zone of the person in an elevated first position relative to the base surface; providing an second support for adjustably positioning an arm body zone of the person in an elevated second position relative to the base surface; and providing a third support adapted 30 for adjustably positioning a leg body zone of the person in an elevated third position relative to the base surface. A non-remote, individually adjustable mechanism is provided for adjusting the elevation of the support. The method further comprises

adjusting the first support, the second support, and the third support to customize the first position, the second position, and the third position, respectively, to personal attributes of the person to minimize pressure points and musculoskeletal stress during rest. Where the first, second, and third supports each comprise

5 inflatable/deflatable pillows, and the method comprises inflating and/or deflating the supports to attain the customized positions. The method may further comprise adjusting the first, second, and third supports to accommodate the person resting on his or her side or resting on his or her back.

Still another aspect of the invention comprises a pillowcase comprising
10 a fabric that is moisture-wicking, heat-normalizing, or a combination thereof.

Yet another aspect of the invention comprises a system for positioning at least two body zones of a person relative to a base surface on which the person is resting, the system comprising at least two discrete supports, each support having a different thickness. One embodiment comprises a first discrete support for

15 supporting the upper arm/shoulder body zone, a second discrete support for supporting the head/neck body zone, and a third discrete support for supporting the thigh/upper leg/hip/lower back body zone.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1A depicts a person utilizing the three-piece embodiment of the invention
20 while resting on his side.

Fig. 1B depicts a person utilizing a three-piece embodiment of the invention while resting on his back.

Fig. 2 depicts a person utilizing a two-piece embodiment of the invention.

Fig. 3 depicts a person utilizing a one-piece embodiment of the invention.

25 Fig. 4A depicts an exemplary inflatable pillow embodiment with an accessible bladder.

Fig. 4B depicts another exemplary inflatable pillow embodiment with an unaccessible bladder.

Fig. 5 depicts an embodiment having a cushioned outer pocket and a plurality of inserts.

Fig. 6 depicts an embodiment comprising a set of stackable members inside of a pillowcase.

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DETAILED DESCRIPTION OF THE INVENTION

Referring now to Fig. 1A, there is shown a person 10 resting on his or her side 12 on a base surface 14, such as a mattress. A first adjustable support 16 is provided under the person's head/neck 17; a second adjustable support 18 is provided under the person's top arm 19; and a third adjustable support 20 is

10 provided between the person's legs to elevate the top leg 21. As used herein, the term or "top arm" and "top leg" refer to the respective arm and leg that are elevated above the base surface, whereas the "bottom arm" and "bottom leg" refer to the respective arm and leg that rests upon the base surface. The terms "upper arm" or "upper leg" refer to the portion of an arm or leg above the elbow or knee, 15 respectively, whereas "lower arm" and "lower leg" refer to the portion of the arm or leg below the elbow or knee, respectively. It should also be understood that positioning of the top leg may also affect positioning of other parts of the thigh/upper leg/hip/lower back zone of the body, which may also include positioning of the knee and lower leg portions of the top leg.

20 In a preferred embodiment, each of the adjustable supports 16, 18, and 20 comprises an inflatable pillow 38, each comprising an inflatable bladder 40 surrounded by a cushioned outer portion 42, as shown in Fig. 4B. Cushioned outer portion 42 may comprise any material known in the art for use in pillows, such as but not limited to foam; cloth batting; or one or more modules filled with down, 25 other types of feathers, buckwheat hulls, and the like. In other embodiments, one or more of the inflatable bladders may be used without a cushioned outer portion or any cushioning at all, or without being completely surrounded by a cushioned outer portion, such as where the bladder is inserted in an enclosure that provides cushioning over less than all of the bladder or where the bladder itself has one or 30 more, but less than all, sides covered with integral cushioning elements.

Although air is a preferred fluid for inflating the bladder, any fluid, including liquids, such as water, or gels, may be used. Similarly, although an

inflatable pillow is preferable, the adjustment mechanism may comprise any type of adjustment mechanism known in the art adapted for reversibly changing the distance D between two opposing surfaces 39 and 41 inside the support. Thus, the supports may be mechanically adjustable, such as, for example, via a scissors-jack-

5 type mechanism well known in the art or via a set of stackable members, as disclosed herein later; pneumatically adjustable, such as via inflation with air or another gas; or hydraulically adjustable, such as via inflation with a liquid such as water, a saline solution, or the like.

Pillow 38 may comprise an outer casing 45 having, for example, a
10 zipper 46 for creating an enclosure that keeps the cushioned outer portion 42 and bladder 40 sandwiched together. Although shown with a zipper in Fig. 4B, any type of fastener for closing the pocket created by outer casing 45 may be provided, such as VELCRO® microhook/microloop fasteners (56, as shown in Fig. 5), snaps, buttons, and the like. In an alternative embodiment, no such fastener may be
15 present (not shown), wherein the pocket is just open. Cushioned outer portion 42 may be a single piece with a hollow center into which bladder 40 is inserted, or may comprise a plurality of individual pieces, such as members made from foam or batting. In one embodiment, cushioned outer portion 42, outer casing 45, and an inner lining 43 may be integrally bonded together, such as in a quilted fabric that is
20 fabricated to create what is essentially a cushioned casing 51 for bladder 40.

Bladder 40 may comprise rubber, plastic, vinyl, or any non-porous material known in the art adaptable to contain a liquid or gaseous fluid, such as air. Bladder 40 typically has an inflation/deflation valve, which may be any such valve known in the art, but for example may comprise a valve such as is disclosed in U.S.
25 Patent No. 2,859,932 to H.H. Mackal, incorporated herein by reference. An inflation tube 47 may be attached to valve 44 to provide an extension that reaches closer to the zipper 46, so that the pillow can be conveniently inflated. Inflation tube 47 may comprise surgical tubing, or any other type of rubber or plastic tubing known in the art that has a soft feel and thus will not interfere with the comfort of the user.

30 The system may further comprise a hand pump, such as a DOUBLE QUICK Mini Air Pump by INTEX® or a bulb-type hand pump such commonly used on blood-pressure-testing cuffs, or may comprise any type of pump or other inflation mechanism known in the art. The pump is preferably attachable and detachable to valve 44 or inflation tube 47 to allow use on each of the several pillows in the system

(or on each of a plurality of inflatable chambers in a single pillow with multiple chambers) and to facilitate stowing away when not in use. In another embodiment, an integral hand pump may be provided with each pillow to facilitate adjustments in the middle of the night, such as, for example, systems described generally in U.S.

5 Patents Nos. 6,327,725 to Veilleux et al. or 4,979,249 to Meade, II, incorporated herein by reference. Typically, however, a user inflates the pillow to a customized degree of inflation comfortable for that user and does not need to repeatedly adjust the pillow. Other inflation mechanisms may also be used, such as inflation via blowing up the pillow using the mouth and lungs of the user or using a pressurized

10 source of air, such as a pipeline in a hospital setting or canned air.

Although shown in Fig. 4A where the bladder is accessible by undoing a fastener 46 that closes the pocket in which bladder 40 is inserted, in another embodiment, shown in Fig. 4B, bladder 40 may be non-accessibly sealed inside the casing (such as if the pocket is sewn closed after insertion of the bladder during manufacture) with only the valve 44 accessible to the user, typically at the end of valve extension 47, rather than the valve being affixed directly to the bladder. The valve may optionally be sewn in place to cushioned casing 51.

The system may comprise three or more individual pillows, as shown in Fig. 1, or may comprise fewer than three individual pillows, as shown in Figs. 2 and 3. In the three-piece embodiment shown in Figs. 1A and 1B, the individual pieces may be attachable and detachable to one another, such as for example, using snaps 48 and 49 (shown in Fig. 4) attached to the pillows or the pillowcases. Although the pillows may be attached to one another or adapted to be so attached, it is not necessary. Because it is preferable to provide inflatable pillows that are capable of use with standard twin, full, queen, or king pillowcases for ease of coordinating with designer bed fabrics, the snaps are preferably attached to the pillows rather than the pillowcases. Each pillow may comprise one or more male snaps 48 and one or more female snaps 49 so that male snaps from one pillow may interlock with female snaps of another pillow to provide attachment. The pillow is therefore inserted in the pillowcase with the snaps positioned closest to the opening of the pillowcase to enable such attachment. Any type of attachment mechanism may be used, however, including VELCRO® microhook/microloop fasteners (58 and 59, in Fig. 4B), buttons and mating buttonholes (68 and 69 in Fig. 5), and the like. In one embodiment, the pillows may have male and female socket members and/or

other attachment features as disclosed in U.S. Patent No. 4,794,657 to Avery, incorporated herein by reference.

In an embodiment with two individual pillows, such as shown in Fig. 2, a first pillow 20 having two adjustable sections 22 and 24 and a second pillow 26 having a single adjustable section 28 are provided. Although shown with the two-section pillow 20 supporting the arm and leg of the user and the single-section pillow supporting the head/neck, an embodiment wherein the two-section pillow is adapted to support the head/neck and arm and the single-section pillow is adapted to support the leg may instead be provided.

10 In an embodiment with a single integral pillow 30, such as shown in Fig. 3, the pillow comprises three adjustable sections 32, 34, and 38, which are positioned to support the leg, arm, and head/neck, respectively. Although an embodiment with three adjustable section is shown, embodiments with only any two of the adjustable sections may be provided.

15 Although shown in Figs. 1A-3 with one, two, and three individual pillows to provide support for the leg, arm, and head/neck zones, it should be understood that additional adjustable sections may be provided to address other zones. Similarly, it may be desirable to provide multiple sections to handle one zone, such as one adjustable section for the neck and another for the head, or 20 several adjustable sections along the length of the legs. The support structures (and bladders inside, for inflatable embodiments) may be simple oblong shapes that are narrower on the ends and wider in the middle, may be generally rectangular in shape with even inflation in the middle and the ends, or may be contoured or shaped to fit a particular zone.

25 One aspect of the invention comprises a kit comprising two or three inflatable pillows and instructions for how to arrange the pillows as shown in Fig. 1A or 1B to provide a restful sleep. The kit may further include a hand pump and/or heat normalizing pillowcases (discussed below) for each of the pillows. Another aspect of the invention may comprise a kit comprising a single pillow with two or 30 three adjustable sections and instructions for how to arrange the pillows as shown in Figs. 2 or 3 to provide a restful sleep. The kits may include less than all of the pillows required to completely set up the arrangement in Figs. 1A, 1B, and 2, with an additional single pillow available for purchase separately. Although inflatable pillows

have generally been known in the art for some time, particularly for use under the head and neck, a novel feature of the present invention is the combination of two or more pillows or a single pillow with two or more sections having the characteristics and dimensions required to provide optimal musculoskeletal alignment over multiple 5 zones of the body.

The system of the present invention is adapted to minimize stress from tension and pressure points in the head/neck zone, the shoulder/upper back/arm zone, and the lower back/hip/leg/thigh zone. Preferably, the pillows are adjustable to a position that is sufficient to provide optimal spinal alignment for a 10 side sleeper and to relieve pressure points. Thus, as shown in Fig. 1A, the present invention allows the head/neck of a side sleeper to be elevated about base surface S to a customized, optimal height where the neck vertebra are aligned with the spine along axis A; allows the top arm to be elevated to rest in a plane P1 that is essentially parallel to and elevated above the base surface plane S a sufficient 15 distance to relieve tension on the user's shoulder; and allows the top leg to be separated from the bottom leg to minimize pressure points due to leg-to-leg contact and to eliminate tension created when the bottom leg rests on base surface S rather than on a plane P2 that is essentially parallel to and elevated from the base surface by a desired amount. By "essentially parallel to" it is recognized that an individual 20 user may be more comfortable resting the arm or leg in a plane that is slightly angled to the base surface S.

It should be understood that the system is intended to be customized to be comfortable to any user. The system of the present invention promotes a sounder sleep because it allows the user to customize the system to provide optimal 25 spinal alignment and to eliminate pressure points, thereby eliminating causes of discomfort that may be disruptive to sleep.

Another cause of discomfort during sleep may be the development of "hot spots" on the pillowcases. Thus, another aspect of the invention is to use a pillowcase comprising wick-away fabric that conducts heat and/or moisture away 30 from the body. Such fabrics include but are not limited to COOLMAX® fabric made by E.I. duPont de Nemours & Co. or fabrics used in the DOUBLE DRY™ line of clothing marketed under the CHAMPION® brand. The pillowcases are not limited to any particular type of moisture-wicking fabric or heat reducing fabric, however, and any such fabric may be used. "Heat reducing" fabric comprises any fabric that

conducts heat away from an individual hot spot and reduces the temperature at that spot, including fabrics that spread or "normalize" the temperature throughout a larger area of the fabric, or fabric that actually provides overall heat reduction, such as via moisture-wicking and evaporation, or by any other mechanism.

5 The sleep system of the present invention is also adapted for sleepers who prefer to sleep on their backs. For example, as shown in FIG. 1B, adjustable support 16 may be placed under the person's head/neck 17; second adjustable support 18 may be placed on the person's chest or belly on which to rest one or both arms 19a and 19b (or alongside the body to rest one arm, not shown); and third 10 adjustable support 20 may be placed underneath the person's knees to elevate one or both of the user's legs 21a and 21b.

15 While the present system is particularly well adapted for home use to promote a comfortable sleep, the system may also be used in healthcare environments such as hospitals, nursing homes, and the like, and may be used to promote comfort while engaging in non-sleep activities such as reading, watching TV, sunbathing, and the like. In particular, a user resting on one's back may find that the inflatable head/neck pillow is well adapted to be adjusted to increase elevation for TV watching, and the arm body zone support pillow is well-adapted to be adjusted to a sufficient elevation to position a book 50 at an optimal height for 20 reading.

25 Also, although disclosed primarily herein in an embodiment where each of the pillows is adapted to be adjusted with a hand pump as needed, embodiments may also be provided with automatic pumps. Also, although there are drawbacks to having each individual inflatable pillow connected via tubing to a single air source as discussed in the background section of the invention, such an arrangement may still be provided, with an improvement over prior systems comprising the positioning of a valve on the surface of each air bladder, thereby providing the user with the adjustment valve on the pillow itself instead of on a single manifold remotely from the pillow. Thus, for example, an automatic pressure 30 source (such as an electrically operated pump) may be manifolded to the pillows and provided with an automatic start capability when the valve is opened (causing a pressure drop in the manifold below a predetermined level). The pump with all of the valves closed, therefore shuts off. When an individual valve is opened, the pump operates until the valve is again closed. A separate bleed valve (not shown, but

similar to valve 44, for example) may be provided to deflate the pillow without activating the pump. Thus, each pillow or inflatable chamber may have multiple valves, if desired, including an inflation valve and a deflation valve, although in most embodiments, it is preferred to have a single valve for both inflation and deflation.

5 In another embodiment, the adjustability of the various support zones may be effected via stacking of discrete members or insertion of discrete members inside a casing or cushioned pocket. For example, as shown in Fig. 5, cushioned casing 51 may be provided with a plurality of inserts 52a-d. Each insert may comprise a soft solid, such as foam or batting, or even a relatively hard solid, such as but not limited to a hollow or solid plastic, where the cushioned casing provides sufficient padding. In other embodiments, each insert may comprise a filled member (not shown), such as individual air-inflated members, liquid-filled members, gel-filled members, or solids-filled members (such as with hulls, prills, feathers, or the like).

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15 In another embodiment, shown in Fig. 6, a plurality of discrete members 62a-c may be adapted for stacking inside a pillowcase 64 without a cushioned outer covering, or may comprise a plurality of members adapted for stacking without any outer covering whatsoever (not shown). For ease of insertion or handling, the insert or stackable members 52a-d or 62a-c may be provided with an outer covering 54, such as a slick or slippery fabric, as shown in Fig. 6. Each

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20 insert or stackable member may be of equal modular thickness (such as 52a and 52d, or 62b and 62c), or of different modular thicknesses (such as 52a and 52b or 62a and 62b).

25 In either embodiment shown in Figs. 5 and 6, at least some of the inserts or stackable members in the adjustable positioning system are relatively small in thickness so that they lend themselves to relatively small incremental changes in height. For example, a system adapted to support three body zones may comprise a set of at least three modular members in the smallest increment of adjustability desired (such as 0.5" or 1", for example) to enable adjustment of each zone by at least that increment. The system may further comprise a larger number of modules having a greater thickness (such as 1.5", 2" or 3", for example) to allow stacking of the optimal height with as few members as possible. Because pillowcase 64 does not provide cushioning over the stack of members in Fig. 6, members 62a-c are preferably soft in feel, such as is provided by foam, batting, or air-, liquid-, and

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gel-filled members, or solid-filled members with small solids such as feathers, hulls, prills, or the like.

Although the inserts and stacked members are shown in Figs. 5 and 6 with respect to a single adjustable section, support structures having multiple 5 adjustable sections in a single structure (such as are shown in Figs. 2 and 3) may also be adapted to accept inserts or stacked members.

Although shown in a number of specific exemplary embodiments, many embodiments of the invention can be generally described as comprising a support system for providing changeable thickness in a plurality of supports for a 10 plurality of body zones, each section with changeable thickness having a non-remote, individually adjustable mechanism for adjusting the thickness of the section. In other words, the means for effecting the changeable thickness is adapted to be manipulated at the pillow or other support device itself, rather than remotely from the pillow or support device. This non-remote, individually adjustable mechanism 15 comprises the inflation/deflation valve 44 in the inflatable bladder embodiments shown in Fig. 4A and 4B, whereas the non-remote, individually adjustable mechanism comprises the opening in the outer casing 51 or pillowcase 64 and inserts or stackable members in the embodiments shown in Figs. 5 and 6, respectively.

20 Yet another embodiment may comprise a set of two or more, preferably three, non-adjustable pillows of different sizes to accommodate different body zones. For example, the pillows shown in Fig. 1A, rather than being inflatable, may have a fixed size that is designed to be optimal for users in a certain range of sizes. Thus, one exemplary set for average-sized individuals may comprise a head 25 pillow 16 having a thickness t_1 of approximately 8" or less, an arm pillow 18 with a thickness t_2 of approximately 16" or less, and a leg pillow with a thickness t_3 of approximately 12" or less. Although exemplary thicknesses are provided above, these sizes are by no means limiting. Sets of smaller sized pillows may be provided for smaller individuals and larger sized pillows for larger individuals. The thicknesses 30 of the set of fixed pillows may be tailored to optimum sizes for the height ranges of potential users. The adjustable pillow systems described herein may also have different base sizes for each pillow. For example, head pillow 16 may have an adjustable thickness t_1 in a range from 4"-8", arm pillow 18 may have an adjustable

thickness t_2 in a range from 8"-16" and leg pillow may have an adjustable thickness t_3 in a range of 6"-12".

Although depicted herein as having a standard ovoid or rectangular shape, the adjustable and/or non-adjustable supports of this invention may be of 5 any size and shape. Thus, for example, the leg pillow may have a contoured design such as is described, for example, in U.S. Patent No. 6,154,905 to Frydman, incorporated herein by reference. Similarly, the head pillow may have a contoured design such as is described, for example, in U.S. Patent No. 3,829,917 to De Laittre or U.S. Patent No. 6,345,401 to Frydman, both of which are incorporated herein by 10 reference. In another embodiment, any or all of the pillows (not just the head/neck pillow) in the set of pillows may have a thickness that is adjustable in the manner disclosed in the '401 Frydman patent, wherein each of the stackable inserts or pillow sections interlocks with one another, such as in a tongue and groove engagement.

Although various embodiments of the invention have been described, 15 it will be understood that the invention is not limited to these embodiments, but is capable of numerous modifications of parts, elements and materials without departing from the invention.